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# ON MEANING AND UNDERSTANDING<sup>1</sup>

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### § 1. INTRODUCTION.

We give, in the following pages, the results of experiments on the perception of single letters, the understanding of words, and the understanding of sentences. The experiments were performed by what is known as Binet's method, or the Würzburg method, or the method of examination: the stimulus, written or printed, was laid before the observer, who upon signal opened his eyes, fixated the paper before him, and after performance of the assigned task gave a report of his experience. The observers were Miss L. M. Day (assistant in psychology), Mr. W. S. Foster (assistant) and Dr. L. R. Geissler (instructor in psychology); all three had had thorough introspective training. In the experiments of §§ 2, 3, the writer also served as observer.

The method of examination is, without question, merely the first beginnings of an experimental method. Okabe and Clarke, in work published from this laboratory,<sup>2</sup> have proposed to supplement it by the method of confrontation. We ourselves, at one point or another in the course of the present experiments, introduced three novel features. (1) In the experiments of §§ 2 and 4 the observer was instructed to give his account of conscious events in their strict temporal order. Spontaneous reference to this order is customarily made, in most extended reports by the method of examina-

<sup>1</sup>From the psychological laboratory of Cornell University.

<sup>2</sup>This *Journal*, xxi., Oct. 1910 and xxii., April 1911. Ogden curiously regards the addition as worthless, because alterations were not suggested (*Psych. Bulletin*, viii., 1911, 194); it seems to us that confirmation is as valuable as correction. Ogden's suggestion that the confrontation was "quite a perfunctory affair" is both gratuitous and incorrect.

tion, through such terms as *then*, *after that*, etc. We thought it worth while specifically to give the temporal instruction: partly in order to increase the fullness of the reports, partly in order to attain as great an accuracy in the reproduction of the experience as the circumstances of the experiments permitted. As regards the latter point, we found that considerable training was required before the observers indicated the temporal position of every reported event; and we are thus forced to the conclusion that the sequences and coincidences noted by previous writers have a certain inadequacy. As regards the former point, we found that the temporal arrangement was of material aid in the correlation of 'process' and 'meaning,'—phases of the reports which will be explained under (2) below. The actual instruction was to *give as precise and minute an account as possible of everything that occurred in consciousness, in temporal order, making liberal use of such terms as next, then, simultaneous with, and overlapping*. When the report failed to specify the temporal position of an event, a question was usually asked; but the necessity of such questions diminishes with practice. The experimenter, who took down the observer's dictation, began a new paragraph whenever *next*, *then*, *after that*, or any term definitely denoting succession was employed: so that the events of a quoted paragraph are to be considered either as simultaneous or as belonging to a single (though extended) conscious present. But it should be noted that the break of consciousness between paragraphs is relative only; neither 'process' nor 'meaning' terminates abruptly, in order directly to give place to a successor; and the observers were asked expressly to declare when an event of one paragraph lasted over into the next.

(2) The observer in these §§ 2 and 4 was also instructed to place everything, except the direct description of conscious processes, in parenthesis. Previous students of the thought-processes have distinguished between description proper (*Beschreibung*) and a mode of report that is variously named *Kundgabe* or *sprachlicher Ausdruck* or the objective reference involved in the stimulus-error. We do not here enter upon the question whether these three terms cover precisely the same material and designate precisely the same attitude on the part of the observer; nor do we now identify our own reports of 'meaning' with any one of them; it is enough for the present if intimation, linguistic expression, objective reference and report of meaning be regarded as four species of the same genus. What we desired was that attributive description of conscious processes should be marked off, by the observers themselves, from whatever else might enter into the reports;

and we accordingly required them to *put direct description of conscious processes outside of parentheses, and statements concerning meanings, objects, stimuli and physiological occurrences inside*. The procedure was justified by the results: for though failure to specify now a meaning and now a process was at first not infrequent, it grew less and less common with practice, until the twofold report became characteristic of the experiments. It is, of course, out of the question that the observer should on every occasion specify the attributes of every process and the details of every meaning: where analysis is not imperative, *e. g.*, it is sufficient to report 'perception of signal', 'sensations from eye-movement', or 'sensations from the stimulus'. But it is necessary that the observer be trained to distinguish such references to meaning or to the physiological source of his experiences or to the stimulus from description of the concomitant conscious processes; since the perception of a given object or of the same physiological occurrence or of an identical stimulus may, under different conditions, be accompanied by different conscious processes, and what the latter are often needs to be investigated. Moreover, the object of perception is not to be confused with the presented stimulus; if the experimenter desires to know what the observer is perceiving, at a particular moment, he must obtain special reports on the matter from the observer; he cannot assume that the stimulus is perceived as he himself perceives it.—By the use of parentheses we secured in any given experiment a fuller description of processes, where the observer had a tendency to report in meanings, and a fuller statement of meanings, where the observer tended to report solely in terms of processes.<sup>1</sup>

(3) In the experiments of § 3, and to a slight degree in those of § 2, we availed ourselves of a special mode of repetition. If the observer had failed adequately to analyse some complex experience, or if we wished him to verify an analysis already given, or to answer some question after the event, we restored the original conditions of the observation and instructed the observer to 'get back the original complex'. We found that it was often possible, in this way, to reinstate the former experience,—so far, at any rate, as that the observer

<sup>1</sup>It should be said that, while F and J tended, after practice, to make their reports of meanings as full and detailed as their reports of processes, D and G (owing, as was later discovered, to a partial misunderstanding of the instructions given) sometimes reported meanings with less completeness. In these cases the experimenter usually had recourse to questions.

The marks of parenthesis were, as a rule, either entered by the observers themselves upon the dictated report, or inserted by the experimenter with the approval of the observer. The reports quoted in the present paper have been submitted to their authors and approved.

recognised the present complex as a revival of the old. Sometimes the experiment failed; and it speaks for the reliability of the observers that they did not hesitate to report failures. Sometimes specific differences were realised between the second and the first experiences. Complete success, under the limitations of the method, was usual with D, G and J; less frequent with F.<sup>1</sup>

(1) The method of examination furnishes two kinds of report: the 'selective', in which the observer gives special attention to certain features of his experience, and the 'complete', in which he seeks to reproduce the experience as a whole. Since we were unable to say beforehand what was relevant and what irrelevant to our problems, we asked only for the complete account.

By putting questions to the observer, it is often possible to gain information as to matters omitted from the report; and, what is more important, the bringing of the observer's attention to these omissions leads to their avoidance in future. Owing to the danger of undesirable suggestion, very great care is needed in framing the questions; and a careful record of question and answer must always be kept. Our object in the work of §§ 2 and 4 was to drop them entirely, as soon as the reports became spontaneously complete. During the stage of training, however, the observers were frequently requested by the experimenter to supplement a process-report by naming the meaning, or conversely to supplement a meaning-report by an analysis of processes. After some practice, the recourse to parentheses became familiar: though it should be added that no observer was wholly consistent in their use, or entirely regular in paralleling process and meaning.

(2) We cannot insist too strongly upon the necessity of repeated instruction; the task set is so difficult that even the most reliable and most willing observers tend to omissions. A meaning may be stated, while the corresponding process is in whole or part omitted: thus, an observer reports "general notion of a discussion in that book about the psychology of genetics," and a question is needed to bring out the fact that the 'general notion' was carried in kinæsthetic and verbal terms. Or a process may be described, while the corresponding meaning is in whole or part omitted: thus, an observer reports "sensations of slight strain in chest, as breath was held for a moment; sinking in abdomen; other sensations of touch from clothes; other organic sensations not so clear in consciousness," without giving any indication of the meaning of the attitude. There is often failure, even after practice, to report the time of an occurrence, to state fully the object of perception, to give the stages in the development of a meaning, to rehearse the conscious processes present. The observer must therefore be keyed up to his task by insistent repetition of the instruction.

(3) We do not here enter upon the question—which indeed is a question rather for epistemology than for psychology—how it is possible to give two parallel accounts, in terms of process and in terms of meaning, of

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<sup>1</sup>This method of repetition was introduced in order that we might determine whether the method of examination satisfied Wundt's requirement of "Wiederholung bei gleichem beobachteten Inhalt" (*Psych. Studien*, iii., 1907, 332 f.). The results are encouraging; though we offer them only as a first contribution to the settlement of the question.

It is perhaps needless to add that recognition is not conditioned upon possibility of description; we often recognise, quite definitely, something that we are entirely unable to describe.

one and the same total experience. The possibility has been taken for granted by previous investigators (Bühler, Dürr, von Aster), and we simply follow in their footsteps. It should, however, be said expressly that the shift of attitude, from process to meaning or conversely, presented—after preliminary training—no insuperable difficulty to the observer. If a process or a meaning stood alone in the report, the failure was due to inadvertence. All the observers found that duplicate accounts were possible, that processes could be summed up in a meaning, and that meanings could be paralleled by processes. We may add that the word 'process' was chosen, not as the equivalent by definition of sensations, images and feelings, but in order to leave room for any other conscious form (*e. g.*, an imageless thought) that might be discovered.

(4) We append a full report on the experience of understanding a sentence. The observer was instructed to open his eyes upon signal, to look at the paper, to get the meaning of the sentence written upon it, and then to close his eyes and dictate his report. The notes which follow the quotation call attention to the details of the method.

*Observer F.* Stimulus sentence: *She came in secretly.* Time: 1.25 sec.

"Purple (from written words)<sup>1</sup> clear. White (from paper)<sup>1</sup> and black (from cardboard)<sup>1</sup> in background, and these were [comparatively]<sup>2</sup> unclear. Simultaneous with the visual clearness, kinæsthetic-auditory images (corresponding to the words); weak intensity, more as if whispered than as if said in ordinary voice; *i. e.*, lacked deeper tones; and slightly faster than I should ordinarily say them. (The words did not come singly, but the sentence as a whole made a single impression on me; *e. g.*, the period at the end was a part of the total impression. [All this was]<sup>3</sup> Perception of sentence as visual and kinæsthetic-auditory impression.)<sup>3</sup>

"Then vague visual and kinæsthetic image (of Miss X. coming in a stealthy position, on tip-toe with legs bent, through the door into the Audition Room from the Haptics Room)<sup>4</sup>, *i. e.*, blue visual image (upper left part of skirt)<sup>4</sup> and very vague, featureless image, flesh-colored (of left side of face).<sup>4</sup> The image (was projected straight ahead of me, to the position in which the door actually is).<sup>5</sup> Kinæsthetic images in own right upper leg<sup>6</sup> (which was directly opposite in position to the image, as if my own leg was bent); also kinæsthetic images or sensations in muscles, probably intercostals, of right side (such as I get when standing and bending right leg). (The sentence meant: Miss X. came in over there, through the door, secretly.)<sup>7</sup>

"In the fore-period (I told myself: Get the meaning, and set myself muscularly to work hard)."<sup>8</sup>

Notes.—

<sup>1</sup>Reference to stimulus.

<sup>2</sup>Insertions by the experimenter, for the sake of clearness.

<sup>3</sup>Statement of object of perception: a sentence which, as yet, was meaningless.

<sup>4</sup>Statement of object of image.

<sup>5</sup>O fails to say what processes carried this projection.

<sup>6</sup>By agreement, the reference of a process to the body was not included in parentheses.

<sup>7</sup>Completion of understanding; meaning of sentence has been specialised.

<sup>8</sup>The contents of the fore-period were here not under analysis.

## § 2. THE PERCEPTION OF LETTERS

Our problem, in this group of experiments, was to determine what precisely occurs in consciousness when there is 'perception' of a single letter. The method has been described.

The stimulus was a letter written in long-hand; the time of exposure was left to the decision of the observer, the instruction being that he should close his eyes as soon as he had experienced as much as he could report with accuracy and completeness. Usually, the time of observation was 1 to 3 sec.

*The processes involved in perception.*—For the most part, the visual sensations aroused by the stimulus are not sufficient, of themselves, to constitute a perception of the particular letter; some additional process or processes must supervene. Since the office of these additional processes is to designate the object of perception, we shall call them, in brief, 'designatory processes'. They generally consist of kinæsthetic or auditory sensations or images as of pronouncing or hearing the letter, or of a combination of the two. The following Table summarises the results.

Observer	Total number of perceptions of letter	D. P. reported	Associative processes reported without perception
D	14	13	1
F	15	10	0
G	10	9	2
J <sup>1</sup>	21	21	2

(1) If the D. P. are absent, there is usually no perception of the letter. Two instances are appended.

Observer D. Stimulus Y.— . . . Then sensations in throat (of repeated contraction and relaxation) accompanied by faint auditory images (of the sound). In the course of this, the perception (of Y) faded away, and attention during this time was on the kinæsthetic sensations and on the idea (that I must not utter the word).

Then (was aware that eyes, which had not been carefully fixating, were now doing it). Strain sensations in muscles around sides of eyes.

Then sensations (of eye-movement) and awareness (that I was following the Y around; and while doing this *it was not Y for me but just a line gure*).

Observer F. Stimulus Z.—When first opened eyes, the black white and grayish sensations became clear (the stimuli being the paper, ink, letter and black background). The extent of the visual field was [O indicates a rough circular outline on the table]. This state was of short duration. (All this was perception of [some] letter on white paper on black ground.)

Later came the auditory image Z and with it the perception (of Z). [All that was at first perceived, as the observer specified on question, was *letter in general*.]

(2) In order to test the above result, the observer was sometimes instructed (oftenest in the case of J) to wait till a time arrived when there were present in consciousness no kinæsthetic or auditory images or sensations as of uttering or hearing the letter, and to begin the report from that time. Two instances may be given.

<sup>1</sup>In two cases from J, in which the kinæsthetic-auditory image as of utterance of the letter was probably or certainly lacking, the D. P. were given in the form of images of incipient right-hand movements, as for the writing of the letter. These cases are not included in the Table. On the other hand, the Table contains 7 'repetition' experiments, 4 from F and 3 from J: cf. (5) below.

Observer G. Letter G.—Strong strain sensations (from fixation of thickest part of the letter), with great clearness of blue localised to the upper right half, and with special clearness of its extent and form. Much less clear were the other blues of certain extent and form interrupted here and there by white (as if the letter was incomplete, or as if there were breaks in the line.) These other blues were blurred in outline and indefinite in shape and direction. They were simply there, (without seeming to belong together,—which is now carried into this previous experience); [The observer means that the incoherence was present in the original experience, but that he was not aware of it as such; he now notices it, as he frames his report.] (this I call blank empty staring at the stimulus); accompanied intermittently by temperature and pressure and auditory sensations (of expiration) alternately with warm and pressure sensations (of tip of tongue against upper teeth) and by vague white somewhere surrounding the blues. These blues were constant. This whole experience is *not a perception* (of the letter G), but merely a conglomeration or concurrence of certain sensations. No conscious tendency was present to articulate.

Observer J. Letter W.—There were the black and white sensations, but I can scarcely say that at any time there was perception (of any figure or indeed of anything at all), despite the fact that the visual sensations were clear and intense. The best I can say is, that these visual sensations, along with a vague complex of background processes—(those resulting from position of body, eyes, and possibly also from gastro-intestinal organs)—made up a general attitude of staring, which, however, involved no perception at the time, (though it would be correct afterwards to say I perceive, from memory, that there was a figure of such and such a type).—

From these and similar reports it would follow that sensations may appear in consciousness as such, without necessarily forming part of a particular perception.

(3) It may not be superfluous to state that the D. P. appear in other perceptions than those of letters. Here are three instances:

Observer G. Letter Y.—Visual perception, clear (of first part of letter), with slight *kinæsthetic sensations* (of *fixating that part*) and other slight visual sensations (of rest of white field).

Observer J. Letter B.—[Next] a period (when the eye changingly rested on certain parts of the upper strokes of the letter) and there was simultaneous *kinæsthetic-auditory verbal imagery 'thin'* (meaning the lines were thin, and thus constituting a perception that they were so). This perception may have had other components, but certainly those mentioned were the only prominent ones.

Observer F. Letter Z.—Then attention (caught by pendulum swinging). That is, sensations (from pendulum bob seen in indirect vision) were clear, and there were *kinæsthetic images in neck* (as if to swing head with the bob).

A rivalry of perceptions from the same stimulus may show itself in alternation of the D. P. An illustration follows:

Observer J. Letter C.—There was a fluctuation, a struggle of perceptions in successive order. Predominant was a perception (of an apple. Visual fixation was on left side of base of stem of apple). There is no visual image (of an apple), but verbal-motor incipient utterance 'apple' occurred. (When the letter C was perceived, the visual fixation was not as just described), and there was no verbal image 'apple'. At times during the perception (of C there was incipient motor innervation of the index finger of the right hand to follow the curve of C; at times also to continue the movement in the form of an A); and simultaneous with this was a visual image with very faint, hazy and shadowy outlines. I do not remember whether verbal images were or were not present simultaneously with the perception (of the letter).

(4) Sometimes the observer fails to report the presence of D. P., and a question is needed to bring them to light. Thus in one case the observer



reports 'attention attracted to the horizontal line,' and only in reply to question by the experimenter is it added that there were simultaneous kinæsthetic sensations from eye-movement,—though these obviously played the part of D. P. in the perception.<sup>1</sup>

We have said that, if the D. P. are absent, there is 'usually' no perception of the letter. The rule has possible exceptions. Especially during the earlier observations, J was often in doubt whether there was a perception of the letter at times when the contents of consciousness were predominantly visual. Thus, with stimulus G, he reports "a period during which the visual sensations alone were prominent, with simultaneous pain and pressure sensations about eyelids and probably in other muscles of eyes. During this period there was no well-defined well-developed perception of G; at most there was a hazy and ill-defined perception; but I cannot say with surety whether there was this or none at all."

(5) The Table mentions five cases in which no perception occurs, notwithstanding the presence of associated processes. In three of these, the first, third, and fifth of those quoted below, this failure seems to be due to the absence of clear visual sensations from the stimulus; the fourth may have a like cause, since G, in mentioning vague visual sensations in the fifth, says that perhaps the fourth case was similar; but for the second case we have no explanation farther than that suggested in the report itself.

Observer D. Letter B.—Then sensations in larynx, repeatedly in rhythm. At the same time there was no visual perception (of letter B),—*only vague indistinct sensations (of blackness and whiteness)*, of long duration.

Observer J. Letter M. Time, 20 sec. Instruction: Repeat to get back the visual sensations as they occur when perception of M is absent. [A previous regular report, as well as repetitions of this occurrence with the letter, had been made.]—I am unable to report according to temporal order this time. (The eyes kept running over the stimulus and there was continual tendency periodically to utter M.) At most of these times there was perception (of M), but there were other times when this imaginal utterance was present simultaneously with visual sensations from the stimulus, yet no visual perception (of M). This was succeeded by a period in which, with the same kind of imaginal utterance, there was again visual perception (of M). It was apparent that there was some difference in the visual sensations or in the concomitant kinæsthesia, *i. e.* images (of eye-movement or head-movement). But the difference was delicate and hard qualitatively to describe.

Observer J. Same letter. Instruction: Repeat and imaginally utter M periodically. Time, 3 sec.—(The periodic utterance occurred.) I am not sure but that the visual sensations were attentionally clearer between utterances than at the points of utterance. But it was apparent that the strong perception (of M) that usually attends such utterance was absent.

Observer G. Letter Y.— . . . Next clear verbal kinæsthetic-auditory complex (whispering Y) with faint kinæsthetic sensations (from eye-movement over the whole letter successively in the order of writing it). (All of this is perception of the letter.)

(Next repeated whispering) with kinæsthetic sensations (from eyes moving backwards over whole letter); same kinæsthetic-tactual-temperature [complex] (from exhaled breath) vaguely present. (This repetition is not a perception,—but merely a concurrence of these mental processes. I am unable to say what exactly is the difference in consciousness [between

<sup>1</sup>The stimulus in this case was a geometrical figure. With the letters, and indeed with any form of frequently recurring stimulus, such cases become, in our experience, rare. It should, however, be added that the D. P. are by no means always obvious; sometimes both skill and practice are required for their detection.

the perception and non-perception as they occurred above]. Am doubtful as to whether there was any conscious difference, unless the first repetition was accompanied by a vague feeling of familiarity—slightly pleasant, while the later repetitions were indifferent, and, so to say, automatically continued.)

Observer G. Same letter. Instruction: Repeat the mental situation [as above].— . . . Next (whispering) complex becomes still less clear. Vague visual sensations, black and white, without any connection between them in consciousness,—no consciousness of their form or extent. Drowsy sensations practically indifferent. (All this is not perception of *Y*.) This description of the non-perception of *Y* differs from the original non-perception [*i. e.* that described in G's report above] in point of the drowsy sensations and the vague visual sensations,—both of which may have been previously present, but which were not reported.

*Perception as meaning.*—We turn now to the 'meanings' that appear parenthesized in the reports of our observers. The main point to note is that *the precise statement of meanings is by no means easy*. Just as processes flit by on the passing instant, so do meanings change and elude the observer; and the skill in expression of meaning acquired in daily life is comparatively rough and superficial. This fact may be illustrated in two ways.

First, it is often not enough to record simply that 'the perception of the letter' occurred; what is perceived is frequently—perhaps always—something more complex. We gave to F the special instruction that he should state, precisely, what he perceived; and the result justified the specialisation of method. For example:

Letter Z.—(As soon as I opened eyes) perception (*of Z placed on white paper in a particular direction from left upper corner of paper*). This was clear visual sensations (from black Z and white paper), also sensations (from upper left-hand corner of paper). The attribute of extent [form and position] of this corner and the visual sensations (from Z) were clearer than the sensations (from the white paper), which in turn were perhaps clearer than those (from the black background). Simultaneous or immediately after and forming a part of this perception, abbreviated auditory image Z. ((I notice now, in reporting, that this image was purely sibilant.)) There were also vague kinæsthetic images or sensations in throat and lips, those in lips being the more noticeable.

Letter D.—(Soon as opened eyes) gray and white clear (from paper and ink). Simultaneous auditory image D. These visual sensations were clear only for a brief time, about one-tenth of the whole period. The auditory image was of higher pitch and less intensity than it would be from spoken D. Its other attributes, clearness and duration, were the same as if I had uttered D. (There was *perception of D on white paper*.)

Secondly, the stimulus frequently arouses other perceptions than those of the particular letter, and the object of these perceptions needs careful statement. Examples may be found in reports already quoted; we add one further instance:

Observer D. Letter A.—Kinæsthetic sensations retreat to margin of consciousness; become non-focal, non-clear; simultaneous visual perception (*of a dark line of the shape A on a white ground; it was not perception of*

A). Sensations of eye-movement, plus an awareness (of the same along the figure, thus) [observer indicates the direction, which is that taken by the pen in writing the letter], plus kinæsthetic sensations especially in the neck, but not definitely localised and not distinct.

*Summary.*—The perception of a particular letter usually depends upon the arousal of contextual associates, which we have termed 'designatory processes'. The direct visual apprehension of the stimulus, *i. e.* the presence merely of ordered visual sensations, does not suffice as a rule, under the conditions of our experiments, for the perception of the letter.

These designatory processes may characterise other perceptions, as well as the perception of a letter.

From knowledge of the stimulus, the experimenter cannot determine the nature of the perception at a given instant; a report of the precise object of perception must be obtained from the observer.

Variation of the object of perception, with a given stimulus, is accompanied—again, under the conditions of our experiments—by variation of the concomitant or underlying 'processes'; this variation may usually be traced both in the designatory processes and in the processes which subserve accommodation of attention.

### § 3. THE MEANING OF WORDS

The experiments now to be reported were the first made in the present investigation; the method was tentative, and the observers were comparatively unpractised for the problem in hand. The usual method of procedure was as follows: A written word was laid before the observer for a period of 1 min. He was instructed to fixate the word, to utter it with quick repetition, and to get its meaning. The concluding 10 sec. were marked off by signals; and the observer's task was to report what occurred in consciousness during this particular interval.

Our aim in adopting this method was to secure frequent appearances and disappearances of the verbal meaning, and so to provide repeated opportunities for its analysis. The method was fairly successful, though the period of 10 sec. proved to be too long for a complete report; the experimenter was therefore obliged in many cases to have recourse to questions—made as little suggestive as possible—in order to secure omitted information and, less frequently, in order to verify the absence of an unreported item.

The special form of the method which involved *repetition* has been described above, p. 555. Another variation was sometimes introduced, by which a feature of the original report was *eliminated*, and the consequence of this elimination noted. Thus, with the word *silently* G reports the presence of kinæsthetic-verbal images 'still' and 'silently means *ruhig*'; these images carry the meaning of the stimulus-word. He is thereupon in-

structed to fixate the word and to articulate, as before, but not to permit the rise of such verbal associations. The report of the changed situation reads: 'No meaning to the word. Just sounds and just sensations from articulation.'

The repetition and prolonged fixation of the stimulus-word had the effect, as we expected, of intermittently destroying associations. But they led also, in some cases, to the disintegration of the perception itself. Special parts of the word might stand out and be perceived in place of the whole. Thus, a kinæsthetic or auditory or combined image of one of the letters arises, accompanied by visual fixation of that letter, and perhaps leaving the rest of the word visually (peripherally) obscure: then there is perception of the single letter rather than of the whole word, despite the fact that the word is being uttered. Our records suggest, though they do not prove, that so long as there are visual sensations from the whole of the word, with simultaneous enunciation of it, the perception remains.—Cf. E. Severance and M. F. Washburn, this *Journal*, xviii., 1907, 182 ff.

No definition of 'meaning' was furnished by the experimenter. F at first showed occasional uncertainty as to what constituted meaning; and D for some time showed occasional doubt and inconsistency. Eventually, however, the reports of all four observers became practically uniform. It is needless to say that no observer was informed of the results obtained from the others, and that all were cautioned not to discuss the experiments outside of the laboratory. Illustrations of what were called 'meanings' follow.

Observer D. Stimulus *bloody*. [The word has been articulated and fixated for the previous 50 sec., and these activities are continued during the final 10 sec.] After the signal I said to myself, Must get meaning again; and then said, Must the blood be running?—accompanied by a visual image of an animal of indefinite shape with a flowing wound: Or may it be dry?—now with a visual image of same animal, but I was looking at the edges of the wound where there was coagulation. Visual image of some animal on table, and of Mr. X saying: So-and-so is fond of seeing blood run. Then lost meaning.

Observer D. Stimulus *secretly*. [Conditions as above.] Just after the signal I tried voluntarily to get back to what I had before, when I had the bodily attitude of hiding or concealing. [Later] a visual image of a girl whispering to me disappeared suddenly, and I was left just saying the word.

[In order to give opportunity for the analysis of this imaginal bodily attitude two repetitions (p. 555) were made. Both were successful; in the first repetition the attitude was declared more distinct than in the original experience. The reports, supplemented by questions, brought out the fact that the attitude was wholly kinæsthetic; the observer was crouching, and concealing an object in front of her with body and hands; she was aware of people behind her, who, however, were not given in visual images, but were implied by the nature of the attitude.]

Observer F. Stimulus *face*. [Conditions as above.] When signal came was saying to myself: Wonder whether he wants me to get a noun or a verb. Then pulled myself together [observer indicates retractive movement of arms and inward movement of chest, with forward tension of shoulders and head leaning forward]. Now with attention to sound of voice it was as if I were telling myself to face something. All strains seemed to drag me to the front, and I said: Verb,—with accompanying auditory image. Then vague visual image of experimenter's face, and

then of my own. . . . [The attitude here carried the verbal meaning, the visual images the substantive meaning.]

Observer F. Stimulus *to*. [Conditions as above.] Visual image of a clothed right arm reaching out to the storm-door at the front of this building. While this image lasted, attention was on sound of voice; and then the arm reached *to* the door, but did not open it. This recurred once or twice, except that attention was no longer on the voice. Then I thought I ought to get some other meaning. Then verbal-auditory image *to him*, with kinæsthetic image of moving left hand, which was held forward, from left to right. [During the entire period the observer had nodded his head vigorously with each enunciation; and questions bring out the fact that this gesture means for him the instruction: Get that meaning!]

Observer G. Stimulus *to*. [Conditions as above. Two meanings are given below; the rest of the report, containing two other meanings, is omitted.] Strong kinæsthetic tendency to move to right in the direction of the end-stroke of the letter *o*. The *to* meant a direction, a going somewhere, similar to that given by a guide-post, and there was a sense of being at a loss. . . . Then the numerical meaning, in the form of putting two fingers on the table.

[Instruction: Repeat, and get back the first meaning.—I do not know whether it came as completely as before. There was a tendency to move eyes and body to the right, and to pronounce the word briefly as if saying: To—some place. There was no more of the *Bewusstheit* of direction than this. There was strong fixation of the last part of the word.]

Observer G. Stimulus *cutting*. [Conditions as above.] Meaning present as a faint visual image of a knife-blade and a kinæsthetic tendency to press it down. [Where was that tendency?] In the first three fingers of right hand; it was accompanied by movement of eyes to the place on the right.

Observer J. Stimulus *botany*. [Conditions as above.] . . . Remembrance that must concentrate on meaning. [Not analysed.] Then visual image of green plants and a recently seen hot-house. This disappeared, leaving only the sounds from enunciation. Later an attempt again to follow the instructions [not analysed] was followed by the motor expression 'study of plants' and still later by 'study of plants and flowers,' and these phrases were frequently repeated, notwithstanding the simultaneous enunciation of 'botany'.

The meaning of the stimulus-words were thus carried by visual, auditory and kinæsthetic processes; or, to speak more precisely, the meanings which these processes bore were the meanings of the stimulus-words, in so far as the latter were consciously realised. If we may use the term 'association' in the widest sense, to denote peripheral-kinæsthetic as well as imaginal processes, we may say that the meanings were given in the shape of associations to the words. But the associations to a given word do not remain constant: thus, the visual image of plants and a hot-house, associated to the word *botany*, gives way a moment later to the verbal-motor 'study of plants'. It seems to follow that *the meanings of the words, so far as they are conscious, vary as the associations vary*. The logical meaning of a word, as expressed in a formal definition, does not change; but what we are studying is not this perfect logical meaning, but rather the phases of meaning or the part-

meanings carried by certain transient processes; and as thus understood the meaning must be said to vary.

If the associations are absent, meaning is also reported as lacking. Here are some examples:

Observer G. Stimulus *loud*.—The first impression was of an *Aufgabe* given me by the word, and I started to speak loudly. After several repetitions this *Aufgabe* came again, but then gradually became unconscious, and there was mere mechanical pronunciation. Then verbal image *laut*, leading to stronger accent on the *d* during enunciation. With a new inhalation the same *Aufgabe* returned, and there was greater muscular effort in articulation for the next few pronunciations.

[Instruction: Repeat, without getting this *Aufgabe* association or other similar ones; but try to get what you can of the meaning, and then report.—Practically nothing under these conditions besides the visual and kinæsthetic perceptions, the latter being especially clear. The word has an empty look; I don't know how to describe it.]

For another like case with G., see pp. 562 f.

Observer D. Stimulus *kill*.—The first signal suppressed a coming visual image of an object floating on the water, a clipping from a newspaper, etc. [Then] visual image of the physiological laboratory and of a pithed frog, with appropriate tactual and organic sensations. Visual image of the operating room and of an animal I had killed through over-etherization. Then [other similar images].

[Instruction: Repeat, and get none of these associations, and then describe.—I got a few motor-auditory verbal images,—‘to murder’, and ‘to destroy life’. There were vague sensations from bodily position, and a strain to get something else besides these images. [What?] Tension in my head, and a slight tendency to scowl.

Instruction: Repeat, and do not get these verbal images.—The word is quite lifeless and meaningless. [The observer adds incidentally that this meaninglessness had its organic side—weak breathing, a let-go feeling, a depression.] ]

Observer J. Stimulus *piano*.— . . . Then the writing was no longer in consciousness as a word, but rather as a collection of curved lines.

[Instruction: Repeat, to see what is in consciousness when only these lines are present.—I fixated one letter after another, each time pronouncing the whole word. The other letters were all in consciousness, but not so clear; nevertheless the word was present as a whole. But at times, when fixation was on the *a* or the *n*, there occurred slight optical divergence, and the whole word became slightly [peripherally] unclear. This was continued until there was no consciousness of any of the individual letters seen as such, but only a consciousness of wavy blue lines with a tendency to follow them with the eyes and with the right hand from left to right and back again. But in this the lower parts of the *o* and *a* were omitted. [Apparently here also there are no associations to the word as such, and it is meaningless.] ]

We did not find a characteristic variation of associations with the different parts of speech. Those which stood for the meanings of prepositions, *e. g.*, were not invariably motor tensions or impulses.<sup>1</sup> On the whole, kinæsthesia was more prominent with prepositions than with nouns like ‘piano’ and ‘dog’; but visual and auditory processes were also involved in the meanings. Here are instances of various kinds:

<sup>1</sup>Cf. E. H. Rowland: The Psychological Experiences connected with the Different Parts of Speech, *Psych. Rev. Mon. Suppl.* 32, 1907, 25.

With F, stimulus *to*, the report cited on p. 564 shows that the prepositional meaning is at first carried purely in visual and auditory terms. Again, with stimulus *for*, a report runs: Auditory 'for me', with visual image of *me* written on the paper. Slight tendency to lean forward; rather pleasant. Auditory image: What for? with accent on the *for*. The *for* became very clear.

Again, vision may be mixed with kinæsthesia. Observer D. Stimulus *upon*.—In the fore-period I had visual-kinæsthetic images of myself standing on a pile of wood. And I had various objects given more kinæsthetically than visually,—usually adjusting body for looking from one to another.

Similarly, the meaning of adverbs may be given visually, auditorily or kinæsthetically. Observer F. Stimulus *heavily*.—Visual image of gray cube of iron several times falling on floor of the Audition Room. An unclear auditory image of the noise. Strains in ear-drum. Organic sensations in abdomen such as are involved in hearing a weight dropped, and such images as one would get from a jar of the building. Whole experience repeated a number of times, not quite as fast as I uttered the word. Tendency to nod head synchronously with utterance: meant 'heavily'.

It would be tedious to illustrate this point with reference to adjectives, substantives and verbs; let it suffice to say that with these as with the other parts of speech, as classes, there appeared no characteristic *differentiæ* of associations.<sup>1</sup>—

There were associations reported which were not called 'meanings'. Thus, G reports with stimulus *cunning*:

Certain verbal processes which I should call meanings, and certain others which I should not. Belonging to the last class was 'Cunningham,' formed by adding 'ham' to what was being said aloud. Then visual image of a ham. Then verbal question: What is cunning? followed by verbal image *wise*. Verbal question: What else? then vague complex of the difficulty I should have in writing a definition of cunning. I cannot analyse this, but it included frowning and strains in neck.

What, now, is the difference between these two kinds of associates,—those that carry the meaning of the stimulus-word and those that do not? The question may be answered from two points of view. If we regard the associates as 'processes', in the sense of § 2, then we must reply that the meaning-associates proceed from the instruction given, while the not-meaning-associates are external to the instruction; the former indicate the activity of a particular determining tendency, the latter indicate the activity of reproductive tendencies not connected with this determination. If, on the other hand, we regard the associates as themselves 'meanings', again in the sense of § 2, then we must reply that the associates which carry the meaning of the stimulus-word are, as independent part-meanings, logically relevant to the total word-meaning, while the associates which do not carry the meaning of the word are as independent part-meanings

<sup>1</sup>Thus, we found nothing that could warrant such a generalisation as Rowland makes in the case of adverbs: *op. cit.*, 27 ff.

logically irrelevant to the total word-meaning. Both of these replies, however, require qualifying comment. First, the observer is not (at least, in our experiments was not) aware of any introspective difference between the processes associated under the instruction, and the external associates,—between the processes which carried the word-meaning and the processes which were outside of that meaning. There is no modal or qualitative difference; there is no special 'feel' of 'belonging' to the instruction, or to the situation induced by it<sup>1</sup>; simply, the observer is able, on question, to point to certain associated processes as carrying the meaning of the word and to certain other processes as not involved in the word-meaning. Secondly, the independent part-meanings borne by the associates are not necessarily their obvious or face-meanings; the test of logical relevancy or irrelevancy cannot, any more than the test of procession from the instruction, be applied by the experimenter on behalf of the observer; some ingrained habit of the observer in regard to reproductive tendency, or the disposition into which he is brought by the present situation, may give all manner of warps and twists to the part-meanings carried by the associates as such; constituent processes, which appeal to the experimenter as vehicles of a definite part-meaning, may prove to be extrinsic to meaning, may (in popular phrase) be 'ignored' by the observer; and constituent processes which appeal to the experimenter as casual may turn out to be, for the part-meaning, essential. In every case, then, we are forced back upon the distinctions drawn by the observer; there is no criterion, whether psychological or logical, which can be applied by the experimenter in default of the observer's specific statement.

If we seek to analyse the instance given above (Observer G, Stimulus *cunning*), we reach the following general result. First, to take the associates as processes: we have the utterance of *cunning* arousing, by mechanical sound-association outside of the instruction, the familiar name Cunningham (the name of a friend and colleague); and we have then the added member *-ham* (the observer himself notes the 'addition' of this member) arousing, still outside of the instruction, the image of a ham. Thereupon the observer harks back to his instruction: and his return is effected, typically, in verbal imagery. 'What is cunning?' he asks, in internal speech, and the verbal image *wise* appears, issuing from the instruction 'Get the meaning.' The processes *Cunningham* and *ham* do not aid in carrying the meaning of the stimulus-word; the process *wise* does so aid.

Secondly, to take the associates as meanings: *Cunningham* and *ham* have their own independent meanings, irrelevant to the meaning of the stimulus-word *cunning*; they form separate constellations, outside of the

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<sup>1</sup>It should be said that the observers were not specially questioned upon this point. As the reports stand, however, there is no indication of any 'feeling' of direction or of guidance or of any regional consciousness. The instruction itself was carried in the usual and typical ways; we do not think it necessary to give illustrations.



instruction. *Wise*, on the contrary, has a fringe of meaning of its own, which is logically relevant to the meaning of *cunning*.

We have chosen this instance for analysis, because it is unusually simple; because in it the experimenter can, to some extent, put himself in the observer's place, and see the 'reason' for the admission of some associates to the rank of vehicles of word-meaning, and for the rejection of others. But the simplicity of the instance is quite unusual; and, for that matter, we have no doubt that our analysis, undertaken after the event and on general psychological principles only, is far from complete.

Although the observer was able, without hesitation, to make the distinction between meaning-associates and associates that had no share in the meaning of the stimulus-word, the relation of the meaning-associates to the word-perception was never reported as a specific and characteristic conscious reference. Special questions were therefore asked, in order to determine whether such a specific reference came to consciousness.

Observer G. Stimulus *cutting*. [Question, following report on p. 564: What was the connection in consciousness?] Simply simultaneity. There was no apperception of their belonging together; in fact they did not occur at the same place, as the kinæsthetic motor tendency was in the right hand and the faint visual image was here [indicating a certain place on the table toward which the eye moved and where the imaged hand had not been]. [Was there any conscious connection between the visual image and the word, *i. e.*, the sound and sight of it?] No.

Observer G. Stimulus *Roosevelt*. . . . Vague visual image, a circle with three lines in it. [What connection had the circle with Roosevelt?] That is the visual image I have from caricatures of Roosevelt, the circle meaning his head, the lines his teeth. [What connection was there consciously between the circle and Roosevelt?] I don't know what you mean by connection; the only connection I see is that they came simultaneously or successively.

Observer D. Stimulus *face*. The observer reports visual image of a mask and slight eye and head movements as if to look at it. [What was the conscious relation of that mask to the visual-auditory-kinæsthetic impressions from the word?] It did not have any; I did not consciously refer it to what I was seeing at all.

Observer J. Stimulus was a proper name, and verbal imagery 'the experimental psychologist' had been reported. Observer adds: I cannot answer the question whether there was any conscious connection between the sensations from enunciation and this verbal image. The question seems strange.

[Instruction was given to repeat.] The images came as before, but more vaguely. . . . I found a certain conscious spatial relationship, namely, the visual image appeared close to the word seen; but I was not able to ascertain whether there were other conscious relationships.

We are thus led to the conclusion, indicated in a previous paragraph, that the conscious 'meanings' brought out in these experiments are not the perfect and static logical meanings of definition, but rather partial meanings, particular exemplifications, or what not, touched off under the given instruction by the habit or the momentary disposition of the observer. Logically, the representation of meaning is inadequate; psy-

chologically, it is adequate to the demands of the occasion. We may add that, especially at the beginning of the work, the observers often showed a tendency to verbalise a definition of the stimulus-word, and thus to meet the situation with logical as well as with psychological adequacy.<sup>1</sup>

#### § 4. THE UNDERSTANDING OF SENTENCES

In this part of our study, the stimuli were simple sentences, type-written. These were laid before the observer, who was instructed to open his eyes upon a signal; to read and understand the sentence before him; and then to close his eyes and recount his experience.

We shall outline the results from each one of the observers.

Observer D. Stimulus *Her dress was white*. Time 2.5 sec.—(After the ready signal) sensations of kinæsthesia and strain in head and neck region. Simultaneous awareness (of the *Aufgabe*, and determination to get full meaning); a special set of strain and other organic sensations belongs to this.

(Then signal Now, and opened eyes.) For a moment dazed feeling and blurry sensations (from incomplete fixation) of light on dark.

Then a kinæsthetic dart or snap in head and (sentence) was visually clear. [Later question: Describe this dart or snap. 'In top of head and around eyes'. In scalp? 'No; inside head'.]

Then vague kinæsthetic sensations in throat and indefinite auditory images (accompanied by automatic reading of sentence).

Then mixed-up feeling, unpleasant; sensations of nausea and (of inhibited breathing), (all this meaning: I don't know what I am to do). The whole field of vision was obscure.

Then (rapid eye-movement); quite definite kinæsthetic sensations, but hard to describe. Mixed-up feeling continues.

Then visual image (of myself in a particular white dress). Image was very small and very indistinct, and the kinæsthetic accompaniments were more prominent than the visual. (Definitely localised to the left.)

Then feeling of doubt; (again rapid eye-movement); muddle of organic sensations and unpleasantness. (Signifying: Is this the meaning?)

Then feeling of relief; (general relaxation); totally different set of organic sensations from above. Pleasant. Kinæsthetic sensations in throat (meant assurance that I had the meaning).

This report is typical, in so far that D always records the automatic reading before she gets the meaning of the sentence. It is typical of about one-half of her reports, in that it shows her doubt whether she shall identify the associated ideas, aroused by the stimulus, with its meaning. It is apparent

<sup>1</sup>Since the experiments here reported were concluded, the writer has found that, if he reads any particular word upon a printed sheet (looks at the word, and gets a kinæsthetic-auditory repetition of it), there is usually attached to it a thin coat of meaning which distinguishes it from other words similarly read, though there is a total absence of recognisable associations. Save for two or three possible instances, whose interpretation is not clear, such direct or incorporated meaning did not appear in the experiments of this Section. On the general question, see Titchener, *Thought-processes*, 1909, 177.

that she finally does thus identify, after finding that nothing else occurs which can be termed meaning. The following excerpts from other reports illustrate this point:

D. *It is very warm in this room.* Kinæsthetic sensations in throat plus auditory images (of words). (Read the line.)

Then a curious feeling, largely organic sensations of general laziness, pleasant warmth, drowsiness, and kinæsthetic sensations (chiefly of eye-movement and strains in head that meant my Office, where I had ten minutes ago been very warm). [The observer reports that here was the meaning of the stimulus sentence.]

D. *Let him bring a glass of water.* . . . Then feeling (of relief), that is, mild pleasantness and less strain in head and different organic sensations in region of diaphragm. Verbal kinæsthetic idea (meaning I don't have to do or say anything to get the meaning; I just know I understand it). At same time there was some kinæsthesia (from eye-movement?) (that constituted meaning of sentence).

Then and slightly overlapping the above, very vague schematic visual image (of some man in the laboratory, I don't know who, standing at sink and holding a glass before the running water). All this was just in grays.

Then verbal kinæsthetic idea (Perhaps this has something to do with the meaning).

D. *She came in secretly.* . . . Then slight kinæsthesia (from automatic reading of the sentence). At last word kinæsthesia (accompanied by sudden eye-movement or blinking). (After this did not fixate paper.) [Later question: Was the meaning of the sentence present here? 'No.' Did you perceive the words or sentence? 'Yes; but *secretly* is the only word I perceived very clearly.']

Then a visual image, vague and schematic (of a girl who was sometimes myself and sometimes Miss X walking on tiptoe into my Office). At the same time organic and kinæsthetic sensations (as if I were going through that performance), namely, respiratory sensations (from repressed breathing), general kinæsthesia (from slight tremor of whole body), articulatory sensations, kinæsthetic sensations (from walking on tiptoe), and contact sensations in arms and hand (from touching sides of doorway as I entered). All this organic and kinæsthetic complex was the clearest thing in consciousness. There were quick alternations of pleasant and unpleasant feelings accompanied by kinæsthesia which I can't analyse now, though it was definite at the time.

Then feeling (of assurance) in terms of respiratory sensations (from rather deep and free breathing), and a certain kinæsthetic complex (from eye-movement, meaning that this attitude of walking in secretly conveyed the meaning of the sentence.)

Next we give a sample of G's reports. It will be seen that there is a very full description of processes. The reader is requested to attempt, as he goes through the report, definitely to decide at what point, if at all, the meaning of the sentence was realised.

Observer G. Stimulus *Did you see him kill the man?* Time 3 sec.—Auditory perception (of word Ready). Simultaneous unpleasant strain and tactual sensations (from hands on face and general position).

Then a pinkish grayish limitless visual perception (of the field of the closed eyelids) accompanied by vague kinæsthetic strain in region of eyes and in eyes.

Then auditory perception (of Now). Faint verbal idea (meaning What a difference in intensity between the Now and the Ready)! The opening

of the eyes is accompanied by a succession of blurs, partly gradual, partly sudden, with vague strains from the front part of the eyes themselves. At the same time recognition (of the white strip) with indefinite indistinct outlines, and with similarly indefinite blue sensations strung along a horizontal line in center of the white area.

Then faint strains (from fixation of blue complex) accompanied by verbal ideas of articulation.

Then (new fixation) and repetition of these ideas. Background of consciousness almost zero.

After the perception (of the last word) a sudden rise of all sorts of organic, kinæsthetic and tactual sensations localised in abdominal region, mouth region, elbow, and facial areas touched by hand, together with a new visual perception. [Later question: Of what? 'Of objects on table, eyes being open'.]

Followed by verbal idea (What is it?)

Then a general, organic and respiratory, conscious attitude (of relief). (No meaning all the way through.)

It is certain, if we may trust our own experience, that the reader who tried to discover the point at which a meaning might have been realised failed in the attempt; and the failure emphasizes the difference that we have drawn between report of 'meanings' and report of 'processes'. Or, to put the matter differently: If the observer had omitted the information 'No meaning', and had challenged the experimenter or any one else to state when (if at all) the meaning of the sentence was realised, and what this particular meaning was, the person thus challenged would have found it impossible to infer the meaning from the description given of the corresponding processes. Information about meanings as well as description of processes—we have made the point before, and we shall recur to it again—must come always from the observer himself.—

There are five other cases in which no meaning is reached. Sometimes meaningless reading is followed by the meaning. Thus:

Observer G. Stimulus *The iron cube fell heavily on the floor.* Time 4.5 sec.—Visual perception (of words) accompanied by imaginal and articulatory processes (of reading). The first perception (of the third word) was vague; (in fact, it was not a word but a blot). It became a word as soon as certain parts (of the blot) stood out more clearly and were verbalised. (The rest of the sentence was first perceived as meaningless words, then re-read) with strong motor tendencies around the eyes (meaning attempt to see an iron cube fall down from the table.) The perception (of the word Floor) was accompanied by a faint auditory image (meaning a very loud sound). (Then closed eyes.)

In yet other cases the meaning comes simultaneously with the perception of the words, and is carried by non-verbal images or sensations. We may therefore say that (save for one instance, which resembles the three peculiar reports of F to be discussed below) the reports of G are like those of D; the perception of the words, that is, visual sensations accom-

panied by designatory processes, does not necessarily involve awareness of the meaning of the sentence, which either (1) comes in terms of non-verbal images or sensations, appearing simultaneously or later, or (2) does not come at all.

The reports of F show two types: in the one, perception of the words or of the sentence precedes the meaning, which finally appears in terms of non-verbal images or sensations; in the other, these meaning-associates occur simultaneously with the perception. There are, however, three reports which stand by themselves. We give two of them, in part:

F. *It is very warm in this room.* 2 sec.—Purple sensations (from words) clear. White sensation (from paper) and black (from background) in background of consciousness. Also very weak strain sensations in chest, in background, which remained comparatively constant in intensity while I was reading. Simultaneously with the reading, auditory images (of the words). (Strain sensations mean: I am under *Aufgabe* to read and interpret and not to waste too much time. Visual sensations plus auditory images carried in themselves the meaning of the sentence.)

F. *The affair was bewildering.* 1 sec.—White and black sensations (from paper and background) in background of consciousness. Simultaneous with the visual clearing of each word, auditory images. (The meaning of the sentence was in the auditory images and visual sensations themselves. No other context to carry the meaning that I can find.)

If we may assume that F has not overlooked something, we have the result (confirmed by a single case from G) that the visual and auditory images and sensations from reading might be the sole processes present in consciousness, while yet the sentence had meaning.<sup>1</sup>

We turn now from 'processes' to 'meanings'. And we note that it is not enough for the observer to make the bare statement that he did, or did not, understand the sentence. For oftentimes, at the moment of understanding, the sentence has a special or peculiar meaning.

An illustration has been given in the report on p. 557. Another follows.

F. *His face was very serious.* . . . (Read the sentence over again), that is, visual sensations and auditory images as before, except at a slower speed. Accompanied by kinæsthetic sensations in face (from frowning) and, I think, sensations or images from (slight nods of head towards the words, for emphasis). (Determined effort to see what the sentence meant. Meaning clear this time.) [Question: What was that meaning? The answer came with conviction and immediately.] (*My face is very serious.*)

<sup>1</sup>Cf. p. 569. The writer finds that he can converse or think in words or in incipient verbal articulations, with the meaning present, while for considerable periods of time he can discern no vestige of sensations or images other than those from the words themselves. There are, in the background, sensations due to bodily position and to general set; but while it is introspectively clear that these play an important part in the whole experience, they do not seem to vary correspondingly with the verbal meanings, as the conversation proceeds or the thought goes on.

Our results do not tell us what is the difference, if any, between the processes occurring in these cases and in those of meaningless reading of the sentence.

So in the case of G: two reports obtained from the same sentence *Her dress was white* show that on the one occasion *her* referred to a particular person, on the other to nobody in particular.

*The Single Word and the Word in Context.*—Every sentence employed as stimulus in these experiments contained, in a prominent place, one of the words that had been employed singly in the experiments of § 3. Several months intervened between the two sets of experiments; and we have no reason to suppose that the repetition was remarked by any of our observers. Our object was to compare the meaning of a word presented singly with the meaning of the same word given in a verbal context. The conditions of the two sets of experiments were by no means parallel; still, certain results appear to be trustworthy.

There are a few cases in which the associates of the single word recur (usually with some alteration of form) in the cluster of associates aroused by the sentence. Thus, in both experiments a proper name calls up, for one observer, a visual image of the same person; 'process' and 'meaning' are identical in the two reports. In another instance, the word *face* has the same reported meaning under both conditions, though the 'process' appears in the one experiment as a visual image, in the other as a kinæsthetic complex.

In the great majority of cases, however, the associations traceable to the word in context are not those previously aroused by it in isolation. This result harmonises with the statement made on p. 564 regarding the variable character of meaningful associations. The word-in-sentence is not a separate stimulus, but merely a constituent of a total stimulus, which is the sentence; as constituent of the total stimulus it may, of course, set up determining tendencies in the sense of its own meaning; but this meaning is now only a phase of the total meaning of the sentence, a meaning of incorporation or of implication; and it is therefore impossible to predict, from the report on the single word, how the meaning of the word-in-sentence shall appear in consciousness. G reports, with the stimulus *heavily*, 'Meaning was mostly kinæsthetic, and secondarily organic.' With the stimulus-sentence *The iron cube fell heavily on the floor*, this mode of meaning has lapsed; the effect of the word *heavily* shows only in the 'faint auditory image (meaning a very loud sound)'. We may refer also to the reports of D on *secretly* and *She came in secretly* (pp. 563, 570), which illustrate the same point. The difference was especially marked in the case of prepositions: taken alone, these words tended to form a context of their own, verbal or attitudinal (by gesture); occurring in a sentence, they simply colored the meaning of the total stimulus.—Cf. the remarks of H. M. Clarke, this *Journal*, xxii., 1911, 236 ff.

*Summary.* 1. The meaning of a sentence is often entirely lacking at the first reading, *i. e.* the initial perception of it, and appears later, borne by processes representative of its content or of some response to that content made by the observer.

2. Sometimes these representative processes come with the initial perception, and the sentence at once has meaning; sometimes they seem to be absent, while the meaning nevertheless arises.

3. The same stimulus-sentence may give rise to different meanings for the same observer, so that it is not enough for him to say that he understood it; he must be asked to specify precisely what he understood.

## § 5. IN REPLY TO CRITICISM.

The discussion of Imageless Thought has led, time and again, to personal exchanges of regrettable warmth. Yet the issue is, after all, an issue of fact; it is the observations that count, and not the thrusts of controversy. When, for instance, Dr. Watt suggests that an observation made in the Würzburg laboratory is *eo ipso* more dependable than an observation taken in the Cornell laboratory;<sup>1</sup> when, forgetting the genesis of his own Theory of Thinking, he belittles the work of graduate students;<sup>2</sup> when Professor Ogden charges that Okabe's analyses of Belief "would apply equally well to a description of the æsthetic attitude, the ethical attitude, the consciousness of understanding, or indeed any other of the higher apperceptive states of mind;"<sup>3</sup> when he remarks that Clarke's conscious attitudes are "unblushingly" analysed into sensory and imaginal components;<sup>4</sup> when he declares that the method of confrontation is "quite a perfunctory affair" and leads to an "equivocal result;"<sup>5</sup> when he cleverly dubs the sensation-alistic school 'the opposition', and thus puts the champions of imageless contents into the secure position of governmental orthodoxy;<sup>6</sup>—in all these, and in many similar instances, the polemics simply mean "I refuse to accept your results." Or perhaps, since the phrases are polemical, they may carry the further meaning, "although I can't explain them away;" for emotion is likely to appear when argument has broken down.

Let these things pass, then, and let us come to close quarters with Professor Ogden's criticism. This is, in a nutshell, that Cornell observers have been predisposed against "the discovery of meanings in experience", and have therefore confined their introspections to the "known mental categories of sensation, image and feeling in which [they] have been schooled." The best reply to the first of these statements is the fact of the present paper. Professor Ogden's critique appeared on June 15, 1911; and, by that date, the experiments by our 'method of parentheses' had been concluded. It is true that previous Cornell experimenters have intentionally neglected meanings, *in the sense of this term used in the present paper*. But, so far from having a predisposition against meanings, we have in the present work made a systematic attempt to cultivate reports about them. And we reach a result which does not

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<sup>1</sup>Mind, xx., 1911, 403.

<sup>2</sup>*Ibid.*, 403 f.

<sup>3</sup>Psychol. Bulletin, viii., 1911, 194.

<sup>4</sup>*Ibid.*

<sup>5</sup>*Ibid.*

<sup>6</sup>*Ibid.*, 186 f.

accord with Professor Ogden's views: we find that *wherever there is meaning there are also processes*, and we find that the correlated meanings and processes are *two renderings, from different points of view, of one and the same experience*.

We have already stated that it is frequently no easy matter to give a detailed account both of attributes of process and of shades of meaning. the beginner who is set for the report of meanings will be likely to overlook the corresponding processes, and conversely, just as, if he is set for the report of the quality of a sensation, he will be likely to overlook the correlated sensory intensity, and conversely. To be sure, after considerable practice it becomes tolerably easy to report the principal features of the double task, but even then omissions sometimes occur.

But it must be remembered that the danger of defect is two-sided; it inheres in either mode of predisposition. When Professor Ogden writes: "It is precisely in the brief moments of active thinking that the thought-factor is most apparent" (*op. cit.*, 187), he lays himself open to the very objection that he is urging against his opponents. If by the thought-factor is meant the meaning, the topic or object of thought, that must, in the very nature of things, be most apparent under the conditions of quick active thinking; and, again in the nature of things, the corresponding processes must, under such circumstances, be least apparent; the observer is set for meaning,—and even if the instruction is changed, and he is later set for the reporting of processes, the brevity of the experience will work against him. But there is absolutely nothing in the case to compel our belief that meaning without process exhausts the experience, that process is altogether absent.

A like reply might be made to the complaint of Professor Ogden's colleague (*op. cit.*, 193). If the relatively untrained observers gave plentiful meanings in their original reports, and failed to specify processes, that is because they had not been taught to distinguish between process and meaning and to report on the former as well as on the latter. If the trained observers of the later work gave nothing but sensations and images and feelings, that is because they had been taught to observe processes, and the experimenter did not demand of them the statement of meanings. Our experience shows conclusively that observers who have had a long training in process-report are able, after training, to parallel the processes by meanings.

And the same reply, once more, invalidates Professor Ogden's discovery of imageless thought in the quoted report of our observer F (*op. cit.*, 195). "Red : blue :: green : yellow. I started to say this automatically. Then I repeated the stimulus and said 'intermediate' verbally. Some kind of consciousness that meant 'principal colors.' I did not say 'principal'." Rewritten in terms of our method of parentheses, the last sentences would be: "Some kind of consciousness (that meant principal colors.) I did not say principal". F found a meaning present, the meaning of principal colors; and he found also a corresponding process, about which, however, he could say nothing more than that it was not a kinæsthetic-auditory verbal image.

As to the second member of Professor Ogden's criticism, that Cornell observers have confined their reports to the description of sensations, images, feelings, and like familiar modes, and have failed to find a new process (if we use this term again in our present sense),—we must admit the fact. But Professor Ogden has, nevertheless, confused the deed of this non-discovery with the will. The observers did not, it is true,



report on 'meanings' as well as on 'processes,' in the sense of the present study; for this is, we believe, the first instance of the intentional and systematic assignment of the double task in any laboratory. They did, however, have the *Aufgabe* to report all the processes that were present in their experiences. Thus, Okabe writes: "*No hint was given that certain processes were wanted or expected by the experimenter, and no limit was set to the observer's vocabulary.*" "It seems especially important to note that G finds no trace of imageless contents, since he is precisely of what has been described as the imageless type."<sup>1</sup> Can the critic have overlooked these and similar passages? The aim of Clarke's study of Conscious Attitudes was to "bring these experiences to the test of introspective observation, and thus to discover whether or not they are analysable." "The introspections of any one observer show different stages of clearness and intensity of imagery, which allow us to connect, by a graded series of intermediate steps, a complex of vivid and explicit imagery with a vague and condensed consciousness which we suppose to represent what is called 'imageless thought'."<sup>2</sup> Has the critic again read a little hastily?—Let us make the rejoinder concrete. Suppose that you are told: "Here is a pile of coins, of various denominations, some of which are American, some English, some French. Sort the coins out, both by country and by denomination. We are informed that there are also German coins in the pile. Keep an eye especially keenly on this possibility." You sort, and you find nothing but American, English and French pieces. And your conclusion is summarily rejected, *on the ground that you have had special training in the identification and discrimination of American, English and French money!*

A final word on Bühler and his thought-elements. "I was fortunate enough," says Bühler, "to find two experienced psychologists who put themselves at my disposal for the experiments. . . . In the present paper. . . . I shall refer always and only to the observations of Külpe and Dürr. . . . The experimenter must feel himself into the position of his observers, must experience with them, if he is properly to understand them; he must be able to go into their peculiarities, and to speak with them in their own language."<sup>3</sup> Bühler, then, sought to feel himself into the position of his two observers; and, as regards the one of them, Dürr, the attempt—as Dürr has himself written—was unsuccessful. Bühler's thought-element rests, therefore, upon his interpretation of Külpe's reports. And Professor Ogden now tells us that it occurred

<sup>1</sup>This *Journal*, xxi., 1910, 563, 567, 593.

<sup>2</sup>This *Journal*, xxii., 1911, 215, 248.

<sup>3</sup>Arch. f. d. ges. Psychol., ix., 1907, 306, 309.

to Külpe, while lecturing on Leibniz, "that the monads were not 'concepts' but *thoughts*;" here, still according to Professor Ogden, is Külpe's first idea "regarding the character of thought as a distinct mental element."<sup>1</sup> But was not Külpe, then,—to borrow a word of Professor Ogden's—*predisposed* to the discovery of the thought-element?

We greatly regret that we have been unable to compare our results, in detail, with those of former workers in the same field. Limits of space forbid; as they forbid, also, a further exploitation, at this time, of our observers' reports.

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<sup>1</sup>*Op. cit.*, 185.